Federal Aviation Administration
National Simulator Program

Minimum Requirements for Flight Simulator Airport Visual Scene Content

The regulations currently authorize the use of simulators to meet flight training, testing, and/or checking requirements and require that representations of airport scenes be a part of the visual system for each simulator. Additionally, the regulations require that, for qualification of a simulator at Level C or Level D, that simulator must provide visual scenes with "…at least three specific airport representations." The following is provided to clarify the **minimum requirements** for what must be presented in these "airport scenes."

I. General: Simulator Sponsors (i.e., those persons holding, or applying for, a certificate under part 119, 141, or 142; or holding, or applying for, an approved flight engineer course in accordance with part 63) are required to provide airport scenes as part of the simulator visual system, as follows:

A. A minimum of one (1) airport scene for Level A and Level B simulators.

B. A minimum of three (3) airport scenes for Level C and Level D simulators.

C. Each scene provided must be of an airport contained in the Part 119 certificate holder's FAA-approved route structure, or it must be a scene of an airport in the Part 63, 141, or 142 certificate holder's FAA-approved flight training program.

D. Each airport scene provided as a minimum requirement, or provided in addition to those minimum requirements, other than those scenes that may be provided for specific purposes (see footnote #1), must meet the standards as outlined in this document.

E. A runway is defined as a "one-direction," rectangular surface depiction in an airport visual scene, used for taking off or landing. This means that the visibility, color, and directionality of lighting for that runway, and the associated approaches to that runway, must be accurate only for "one direction" of operation, with the direction being that of the "in-use" runway.

F. Each runway designated as "in-use" in a specific airport scene that is used to meet the minimum requirements described in paragraphs "I.A" or "I.B," above, must be evaluated and qualified by the National Simulator Program Manager (NSPM).

G. Each time a runway is selected as a runway "in-use" as part of an airport visual scene that runway must meet the requirements of this document (see footnote #1).

H. With the concurrence of the Training Program Approval Authority (TPAA) and in compliance with the requirements of paragraph "I.D," above, a sponsor may add additional airport scenes (i.e., beyond the minimum requirement) to the available visual database in a given simulator at any time without further involvement of the NSPM. The TPAA is the Principal Operations Inspector (POI), the Training Center Program Manager (TCPM), or the assigned FAA operations inspector.

II. Lighting and Directionality of Lighting Requirements.

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A. Each Level C simulator qualified prior to (the date to be specified), and all Level A and Level B simulators must display the following:

1. The correct color and directionally correct lighting for:

   (a) The appropriate approach(es); and

   (b) The runway(s) "in-use."

2. Lighting for the taxiway(s) associated with the runway(s) "in-use" that is consistent with standard airplane operations. [See paragraph IIC, below.]

B. Each Level C simulator qualified on or after (the date to be specified), and all Level D simulators must display the correct color and directionally correct lighting for:

1. The airport;

2. The appropriate approach(es);

3. The runway(s) "in-use;" and

4. The taxiway(s) associated with the runway(s) "in-use" that are consistent with standard airplane operations.

C. Taxiway Lighting.

1. "White," or "off-white," taxiway edge lighting may be mistaken for runway edge lighting and is, therefore, not acceptable. The FAA recognizes that green taxiway centerline lights may not exist at a specific operational airport. In these cases, green taxiway centerline lights, while not realistic at that airport, is an acceptable simulation of what flight crews will typically see at many US and non-US airports and will not negatively impact the training, testing, or checking tasks accomplished in such an environment. Where the installed visual system is not capable of producing blue colored lights for taxiway edge lighting, green lights may be used for taxiway centerline lights – in which case, taxiway edge lighting is not required.

2. With regard to taxiway light modeling—

   a. The FAA recognizes that, in many cases, the precise location of taxiway centerline lighting may not be accurately modeled in airport visual scenes. In the absence of exact data, taxiway lights are sometimes modeled along the centerline of the taxiway. However, sufficient taxiway lighting must be provided in airport visual scenes between the runway(s) "in-use" and the associated ramp/parking area(s) to facilitate ground operations between those points.

   b. Simulator sponsors and simulator/visual system manufacturers are encouraged to exercise due diligence in obtaining accurate taxiway centerline lighting information for model development of specific airport visual scenes. However, the FAA has determined that the additional cost to remodel specific scenes to

reflect accurate taxiway light locations, particularly on older visual systems with older airport models, is not worth the minimal increase in training value provided by the correct placement of this lighting. In any event, taxiway centerline lighting modeled along the exact centerline, irrespective of centerline stripes, while not desirable, is acceptable.

III. Scene Requirements.

A. For all levels of simulator, each runway "in-use" in an airport scene must include the following (see footnote #1):

1. The surface for that runway;

2. The runway markings for that runway (including threshold markings, runway numbers(see footnote #2), touchdown zone markings, fixed distance markers, edge markings, and centerline stripes);

3. The runway lighting for that runway (including threshold lights; edge lights; end lights; centerline lights, if appropriate; touchdown zone lights, if appropriate; and, leadoff lights, if appropriate).

4. The appropriate visual landing aid(s) for that runway;

5. The appropriate approach lighting system for that runway;

6. The taxiways associated with that runway that are consistent with standard airplane operations. Taxiways must include the taxiway surface and the appropriate taxiway markings (edge, centerline, runway hold lines, and ILS critical area markings) and lighting (edge, centerline, and, if appropriate, runway hold and ILS critical area lights) to facilitate taxi between the runway and the terminal or ramp area;

7. The ramp / gate area associated with that runway / taxiway complex consistent with standard airplane operations. These areas must include the ramp surface, including appropriate markings (e.g., gate number, lead-in lines, etc.) and appropriate lighting for the parking facilities provided;

8. Appropriate terminal buildings to the extent possible dependent upon the visual system installed;

9. General terrain characteristics and significant landmarks in the immediate vicinity of the airport to the extent possible dependent upon the visual system installed;

10. Scenes of airports with more than one runway must have all other runways not "in-use" visually defined by(see footnote #1):

a. Light strings that identify the runway threshold, edges, and end for twilight and night scenes (white or "off-white" lights are acceptable for this identification); or

b. Rectangular surface depictions for daylight scenes.

11. Each navigational aid (if approved for use in that sponsor's training program), for each runway in-use in an airport scene, must be operationally correct and properly aligned for that runway / airport.

B. In addition to the items in paragraph IIIA, above, each Level C simulator qualified on or after (the date to be specified), and all Level D simulators must provide the following content for airport scenes:

1. At least one of the three required airport scenes must provide a minimum of two (2) parallel runways and one (1) crossing runway displayed simultaneously as "in-use" runways;

2. Runway threshold elevation and locations such that they provide satisfactory correlation with airplane systems (e.g., HUD, GPS, altimeter, etc.);

3. Slopes in runways, taxiways, and ramp areas must not cause distracting or unrealistic effects, including pilot eye-point variation;

4. At least one (1) useable gate positioned at the appropriate height. (This is required only for those airplanes that typically operate from terminal gates);

5. Representative moving and static gate clutter (e.g., other airplanes, power carts, tugs, fuel trucks, additional gates, etc.);

6. Representative gate/apron markings (e.g., hazard markings, lead-in markings, gate numbers, etc.) and appropriate lighting;

7. Runway markings and lighting must include appropriate signage (see footnote #3) and a wind sock that provides appropriate wind cues;

8. Taxiway markings and lighting must include the following:

   a. Signage (see footnote #3) necessary for position identification and to taxi from parking to a designated runway and return to parking;

   b. Representative, visible taxi route signage (see footnote #3);

   c. For those sponsors authorized taxi operations in low visibility conditions, a low visibility taxi route that includes the approved references; i.e., follow-me truck, daylight taxi lights, etc.

9. Representative ground traffic, moving and static (e.g., vehicular and airplane);

10. Representative airborne traffic;

11. Representative depiction of terrain and obstacles within 25 NM of the reference airport;

12. Appropriate airfield lighting and approach lighting systems to allow a Visual Flight Rules (VFR) traffic pattern and landing; non-precision approaches and landing; and Category I, II, and III precision approaches and landings; and

13. Representative gate docking aids or an airplane ground marshaller.

IV. Special Requirements**:** Notwithstanding the above requirements, each simulator used for—

A. Surface Movement and Guidance Control system (SMGCS) training, testing, or checking must have at least one (1) SMGCS airport scene with proper markings, signs, and surface lighting for the runway "in-use," to include signage (see footnote #3) for the taxiways to and/or from a terminal or ramp area.

B. Land and Hold Short Operations (LAHSO) training, testing, or checking must have at least one airport scene where at least one (1) runway "in-use" contains the proper markings, signs (see footnote #3), and surface lighting for LAHSO operations on that runway.

Footnotes:

[1] Airport / runway visual scenes may be provided for "specific purposes." Such scenes may, for example, be dedicated to very low visibility (e.g., Cat II or Cat III) conditions and may visibly present only that portion of the scene that would be visible to the flight crew under such visibility conditions. As a result, these scenes may or may not include complete runway markings (specifically, runway numbers); and taxiways, ramp or gate areas, terminal buildings, or other such features may not be present or may be obscured from view. However the appropriate navigational aid(s) and approach lighting system(s) for that runway must be operationally correct and properly aligned for that runway and airport scene. Each such "specific purpose" visual scene must provide that portion of the visible scene necessary to accomplish the "specific purpose" for which it is included in the available database, and, as a result, may or may not, at the discretion of the TPAA, require runway numbers.

[2] Runway numbers are an integral part of runway markings and, unless otherwise addressed in these footnotes, are required as part of the airport visual scene displayed. However, because of the limitations of early Computer Generated Image (CGI) visual systems, the runway scenes generated with some of those early systems are not required to display runway numbers **except** for those scenes used for LOFT training sessions. These LOFT airport scenes will require runway numbers but only for the specific runway end (one direction) used in the LOFT session. The systems required to display runway numbers only for LOFT scenes are:

1. FlightSafety VITAL IV [formerly McDonnell Douglas VITAL series]
2. Redifusion SP3 and SP3T
3. Link-Miles Image II.

Additionally, and again, due to the limitations of early CGI visual systems, there are certain other systems that are exempt from the necessity of including runway numbers as a part of the specific runway marking requirements. These visual systems are:

4. Link NVS and DNVS.
5. Novoview 2500 and 6000.
6. FlightSafety VITAL series up to, and including, VITAL III, but not beyond.
7. Redifusion SP1, SP1T, and SP2.

[3] Airport Signage: Notwithstanding the resolution requirements for the level of simulation involved, airport signs (other than runway distance remaining markers) must be able to be read at a distance of 200 feet when the simulator is not moving.